



REPLY TO  
ATTENTION OF

DEPARTMENT OF THE ARMY  
SEATTLE DISTRICT, CORPS OF ENGINEERS  
P.O. BOX 3755  
SEATTLE, WASHINGTON 98124-3755

October 5, 1998

RECEIVED  
OCT 06 1998  
DEPT. OF ECOLOGY

Environmental Management Branch

SUBJECT: Decommissioning Report for one 2,000 gallon unleaded gasoline underground storage tank located at 4735 East Marginal Way South, Seattle, WA 98134-2385

Steve Bremer  
Toxics Clean-up Program  
Northwest Office  
Washington Department of Ecology  
3190 160<sup>th</sup> Ave, SE  
Bellevue, WA 98008

Dear Mr. Bremer,

Please find included in this transmittal the decommissioning report (Enclosure 1) for the subject underground storage tank (UST). The UST was removed from the site and disposed in September 1997.

Although MTCA Method A clean-up levels were slightly exceeded in some soils left in the excavation, the Corps of Engineers recommends a status of 'No Further Action' for the site. This recommendation is based on the low levels of remaining contamination, the industrial nature of the surrounding area, and the construction of an asphalt barrier between the soils and atmosphere, which prevents human contact with the contaminated soils, and inhibits contaminant migration to groundwater. A detailed description of the site specific characteristics and methods used to calculate the MTCA Method B Clean-up levels is included as Enclosure 2.

I am available to answer any questions at (206) 764-6587.

Sincerely,

Miriam G. Ramsey  
Project Manager

Enclosure 1 Underground Storage Tank Closure Report, Site Characterization Report, Federal Center South, October 1997

Enclosure 2 Technical Memorandum, Federal Center South Petroleum Contaminated Soil Risk Evaluation, August 27, 1998

cc:  
CT-PR (Ebert)

Table 1. Analytical results from soil samples collected after removal of the UST at Federal Center South, September 1997.

Analyte	East Sidewall	West Sidewall	North Sidewall	South Sidewall	Stockpile	Stockpile Duplicate
Depth	6'	6.5'	5'	6'	-	-
WTPH-G	110	11	4.5	120	8,300	4,200
Benzene	1.2	.11	.27	.37	7.4	2.0
Toluene	7.7	.26	.18	3.7	260	84
Ethylbenzene	1.8	.18	.16	1.3	130	49
Total Xylene	13.1	0.67	0.44	12.1	1010	360

The east and south sidewall samples contained concentrations of gasoline range hydrocarbons and benzene above Washington State Department of Ecology Model Toxics Control Act (MTCA) Method A cleanup levels. The stockpiled soil removed from the excavation also contained contaminant concentrations above the cleanup level. Therefore, none of the stockpiled soil was used for backfill and was transported to the Regional Disposal Company for proper disposal.

The presence of higher contaminant levels in stockpiled soils and field observations indicated that the source of the fuel contamination was probably the product lines located directly above the tank. Consequently, most of the contaminated soil was removed during the removal process. Contaminated soil left in place barely exceeded the MTCA Method A cleanup levels for THP-G and benzene.

The excavation was backfilled with imported soil. Prior to backfilling, the excavation was lined with 6 mil plastic. All imported material was placed within the plastic liner. After the imported soil was compacted, the excavation was covered with asphalt to match the surrounding area.

## 2.0 Regulatory Compliance Issues

Analytical results from soil samples collected from the south and east sidewalls of the excavation slightly exceed the MTCA Method A cleanup level of 100 ppm for gasoline range hydrocarbons. In addition, concentrations of benzene in samples collected from the same locations exceed the MTCA Method A cleanup level of 0.5 ppm. However, Method A cleanup levels may not be the most appropriate target for this site. Method A cleanup levels are intended to provide conservative cleanup standards for routine cleanup actions. The industrial land use history of the Federal Center South property and the surrounding area suggests that MTCA Method B cleanup levels are more appropriate. Method B cleanup levels provide protection for groundwater resources but allow for site specific factors to be considered in determining cleanup levels.

One procedure for determining Method B cleanup levels is to use Ecology's Petroleum Contaminated Soils Rating Matrix to determine the Method B Cleanup levels. Not all of

Bottom  
sample?

the site specific parameters required to complete the matrix were not collected during the UST removal, but were estimated after consultation with a member of the Corps of Engineers geology staff. A summary of the Soils Rating Matrix for BTEX is presented in Table 2.

**Table 2.** Results of Ecology's Petroleum Contaminated Soils Rating Matrix for the Federal Center South tank removal site.

Site Category	Matrix Score			
	B	T	E	X
Vertical Separation between contamination and Groundwater: 10-20 ft.	10	10	10	10
Mean Annual Precipitation: 36-54 inches	10	10	14	10
Soil Type: coarse-grained soils with fines	6	6	8	6
Receptor Distance: ¼ - ½ mile	1	1	1	1
Contaminated Soil Area: < 600 ft <sup>2</sup>	2	2	2	2
<b>Matrix Score</b>	<b>29</b>	<b>29</b>	<b>35</b>	<b>29</b>
<b>Average Matrix Score</b>	<b>31</b>			

The above matrix score allows higher cleanup levels than MTCA Method A. The site determined cleanup levels derived from the matrix score are listed in Table 3.

**Table 3.** Petroleum Contaminated Soils Matrix derived cleanup levels for the Federal Center South tank removal site.

Benzene	Toluene	Ethylbenzene	Xylene	TPH Gasoline
1.0 ppm	100 ppm	100 ppm	100 ppm	200 ppm

When these increased cleanup levels are compared to site data, the benzene concentration of the east sidewall sample is still exceeds the cleanup target by 0.2 ppm.

### 3.0 Risk Evaluation

Ecology has established an Interim TPH Policy to allow the calculation of Method B risk based cleanup levels. The analytical data collected during the tank removal does not fully support the procedures described by the Interim Policy. However, it is possible to make a screening level determination of the risks associated with benzene contaminated soils represented by the east sidewall sample. This was accomplished using Ecology's standardized worksheets to determine human health risks associated with contaminated soil. In addition, standardized worksheets were used to evaluate the hypothetical soil to groundwater impacts of contaminated site soils.

No bottom sample ...

Calculations for risks appreciated with contact with contaminated soil used the highest measured concentration on site. Since the correct fraction of aromatic and aliphatic hydrocarbons was not available, the TPH value for gasoline range hydrocarbons was used

to represent each chemical class. This approach is not accurate, but does represent a overly conservative estimation of the potential risks at the site. The calculated non-cancer Hazard Index (HI) was 0.02 for commercial land use scenario and zero for the industrial land use. These HI values are well below 1, which represents an unacceptable risk. Similarly, the cancer risk associated with benzene concentration above the cleanup level was  $8.7 \times 10^{-9}$  for the commercial land use scenario and  $2.65 \times 10^{-9}$  for the industrial land use scenario. Again, these values are well below the  $1 \times 10^{-6}$  cancer risk usually used as screening level for unacceptable cancer risk.

The potential impact to groundwater was evaluated using fate and transport calculations based on Raoult's Law. These calculations are important to determine if partitioning of soil contaminants to groundwater might represent a significant pathway to a receptor population. As was the case with the human health risk evaluation, the highest TPH concentration measured on the site was used to represent all hydrocarbon classes. The results indicate that the potential impacts to groundwater are minor even with this very conservative approach.

#### **4.0 Summary and Recommendations**

The removal of an unleaded gasoline tank at Federal Center South did reveal that a release of gasoline range hydrocarbons had occurred. Field observations made during the removal indicated that the source of the release was the fuel product line located directly above the tank. Consequently, most of the impacted soil was removed from the excavation in the process of removing the tank. Residual soil contamination left in place was only slightly above MTCA Method A cleanup levels. Cleanup levels derived from Ecology's Petroleum Contaminated Soils Rating Index indicate that only one sample exceeded cleanup goals by 0.2 ppm for benzene.

A risk evaluation following procedures described in Ecology's Interim TPH policy indicated that benzene concentrations in site soils do not constitute an unacceptable risk to human health through direct contact. Groundwater impacts are estimated to be very minor when Ecology's soil to groundwater fate and transport worksheet are used to estimate partitioning to groundwater.

Although contaminant concentrations exceed cleanup levels, it is recommended that a IRAR report be prepared and forwarded to Ecology requesting a No Further Action letter for this site. The basis for the No Further Action requested is based on the following factors:

- The asphalt cap on the tank site reduces the potential for contaminant migration and eliminates exposure pathways.
- A risk evaluation indicates that an unacceptable risk does not exist by direct human contact even in the absence of the asphalt cap

- The site is highly industrialized without any drinking water source closer than ½ mile.

# FATE AND TRANSPORT - SOIL TO GROUNDWATER

## "Raoult's Law" Worksheet

CLIENT ID

LAB ID

COMPOUND	Soil mg/kg	MW g/mol	Moles mmol/kg	Mol Frac.	Solubility mg/l	Effect. Sol. mg/l	DF	Well Conc. mg/l
<i>Aliphatics</i>								
EC 5 - 6	120	81	1.5	0.16	2.8E+01	4.4E+00	20	2.2E-01
EC >6 - 8	120	100	1.2	0.13	4.2E+00	5.4E-01	20	2.7E-02
EC >8 - 10	120	130	0.9	0.10	3.3E-01	3.3E-02	20	1.6E-03
EC >10 - 12	120	160	0.8	0.08	2.6E-02	2.1E-03	20	1.0E-04
EC >12 - 16	120	200	0.6	0.06	5.9E-04	3.8E-05	20	1.9E-06
EC >16 - 21	120	270	0.4	0.05	1.0E-06	4.8E-08	20	2.4E-09
<i>Aromatics</i>								
Benzene	1.2	78	0.0	0.00	1.8E+03	2.9E+00	20	1.5E-01
Toluene	7.7	92	0.1	0.01	5.2E+02	4.7E+00	20	2.3E-01
EC >8 - 10	120	120	1.0	0.11	6.5E+01	6.9E+00	20	3.5E-01
EC >10 - 12	120	130	0.9	0.10	2.5E+01	2.5E+00	20	1.2E-01
EC >12 - 16	120	150	0.8	0.09	5.8E+00	5.0E-01	20	2.5E-02
EC >16 - 21	120	190	0.6	0.07	5.1E-01	3.4E-02	20	1.7E-03
EC >21 - 35	120	240	0.5	0.05	6.6E-03	3.5E-04	20	1.8E-05
			9.4	1.00				1.1

Well Concentration must be 1 mg/l or less for soil concentrations to be protective of Method A drinking water standard.

# HUMAN HEALTH SOILS CONTACT WORKSHEETS

CLIENT ID [REDACTED]

LAB ID [REDACTED]

## Non-Carcinogen--Hazard Index

		<u>Residential</u>				<u>Commercial</u>			<u>Industrial</u>		
Compound	Soil ppm	ORfD	Factor	Res. Mult.	HQ	Factor	Com. Mult.	HQ	Factor	Ind. Mult.	HQ
Total aliphatic	120.0	0.06	1.25E-05	2.08E-04	0.03	3.13E-06	5.21E-05	0.01	2.86E-07	4.77E-06	0.00
Total aromatic	120.0	0.03									
Benzene	1.2										
Ethylbenzene	1.8	0.10	1.25E-05	1.25E-04	0.00	3.13E-06	3.13E-05	0.00	2.86E-07	2.86E-06	0.00
Toluene	7.7	0.20	1.25E-05	6.25E-05	0.00	3.13E-06	1.56E-05	0.00	2.86E-07	1.43E-06	0.00
Xylenes	12.8	2.00	1.25E-05	6.25E-06	0.00	3.13E-06	1.56E-06	0.00	2.86E-07	1.43E-07	0.00
Total aromatic+B-E-X	106.6	0.03	1.25E-05	4.17E-04	<u>0.04</u>	3.13E-06	1.04E-04	<u>0.01</u>	2.86E-07	9.53E-06	<u>0.00</u>
Hazard Index					<u>0.07</u>			<u>0.02</u>			<u>0.00</u>

## Carcinogen Risk

Compound	Soil ppm	OCPF	<u>Residential</u>		<u>Commercial</u>		<u>Industrial</u>	
			Res. Mult.	Risk	Com. Mult.	Risk	Ind. Mult.	Risk
Benzene *	1.20	0.029	1.00E-06	3.48E-08	2.50E-07	8.70E-09	7.62E-08	2.65E-09
Total cPAHs *		7.30	1.00E-06	0.00E+00	2.50E-07	0.00E+00	7.62E-08	0.00E+00

\* For parameters not detected PQL values are substituted